

U.S. EPA Landfill Methane Outreach Program Preliminary Landfill Gas Analysis Report for Jackson County Landfill

A landfill gas generation curve was developed for the Jackson County Landfill in Dillsboro, NC, using several parameters specific to the landfill and defaults from AP-42¹. These data were entered into the EPA LandGEM² software to estimate landfill gas production, beginning with the year after the landfill opened. The values of these model input parameters are provided in Table 1. Landfill-specific data were obtained from a Prescreening Report submitted via email³, which is included in Appendix A. These data include the year the landfill opened, the current amount of waste-in-place, and the year of closure. The current waste-in-place amount was used to calculate an average annual waste acceptance rate from the year the landfill opened (1967 estimated) until closure (1999).

It is important to note that, as shown in Table 1, the calculated average annual waste acceptance rate for the landfill was established using an estimated landfill opening year and the closure years. This may result in an underestimate or overestimate of the actual landfill gas production over time. In future analyses, it would be useful to obtain actual annual acceptance rates for years prior to the closure year.

Also necessary for the model to run are the following parameters: L_0 (methane generation potential), k (methane generation rate constant), and the percent volume of methane and carbon dioxide in the landfill gas. Defaults from AP-42 were used for L_0 and k , and LandGEM software defaults were used for the percent methane and carbon dioxide. The AP-42 default value for k for non-arid areas was used because several sources indicated an average annual precipitation of greater than 25 inches for the area surrounding the landfill.

Collection of the landfill gas at its estimated extraction rate of 135 scfm for this year (2002) would be equivalent to any of the following annual environmental benefits for 2002:

Removing emissions equivalent to 3,160 cars
Planting 4,270 acres of forest
Offsetting the use of 71 railroad cars of coal
Preventing the use of 33,600 barrels of oil

Table 1: Model Input Parameters for the Jackson County Landfill

| Model Parameter | Value | Units |
|---|---------|----------------------|
| Year Landfill Opened ^a | 1967 | ---- |
| Landfill Closure Year | 1999 | ---- |
| Waste-In-Place | 725,000 | tons |
| 1967-1999 Annual Waste Acceptance Rate ^b | 22,657 | tons/yr |
| Methane Generation Rate Constant (k) | 0.04 | 1/yr |
| Methane Generation Potential (L _o) | 3,203 | ft ³ /ton |
| Percent Methane in Landfill Gas | 50 | % |
| Percent Carbon Dioxide in Landfill Gas | 50 | % |

^a According to the information provided the landfill opened in the mid-1960s, but for the purpose of producing this model the year 1967 has been used.

^b Calculated based on 725,000 tons of waste-in-place, as indicated in Reference 3.

The estimated waste-in-place in tons and landfill gas generation in standard cubic feet per minute (scfm) for a 30-year post-closure period are shown in Table 2. Also provided is the estimated amount of landfill gas recovered over time, which was calculated using the assumption of a 75% collection rate. The graph was created using the landfill gas production and recovery data in Table 2. The curves demonstrate the landfill gas generation and recovery rates over time and the straight, vertical line indicates the current year.

Though there do appear to be some end-users near the facility, the preliminary results of the Jackson County Landfill model indicate a limited amount of LFG extraction; which, in turn, limits the beneficial-use options. There is a possibility for implementing a microturbine, small reciprocating engine, or greenhouse (boiler option). There is a standard reciprocating engine small enough to operate on as little as 118 scfm, but the site was closed in 1999 and the flowrate is dropping such that there may not be enough LFG generated long enough to justify the cost of a reciprocating engine of this size.

These projections have been prepared specifically for the Jackson County Landfill on behalf of the U.S. EPA Landfill Methane Outreach Program (LMOP), and are based on engineering judgement and represent the standard of care that would be exercised by a professional reasonably experienced in the field of landfill gas projections. LMOP and its contractors ERG and EMCON do not guarantee the quantity of available landfill gas, and no other warranty is expressed or implied. No other party is intended as a beneficiary of this work product, its content, or information embedded therein. Third parties use this information at their own risk. LMOP and its contractors ERG and EMCON assume no responsibility for the accuracy of information obtained from, compiled, or provided by other parties.

References

1. Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources. Chapter 2: Solid Waste Disposal. Section 2.4.4.1. U.S. EPA. November 1998. <http://www.epa.gov/ttn/chief/ap42/ch02/final/c02s04.pdf>
2. Landfill Gas Emissions Model, version 2.01. U.S. EPA. January 6, 1999. <http://www.epa.gov/ttn/catc/products.html>
3. Prescreening Information from Jim McElduff, Altamont Environmental, to Juene Franklin. January 22, 2002. Shown in Appendix A.

Appendix A

E-mail Attachment Containing Data for the Jackson County Landfill

LANDFILL PRE-SCREENING INFORMATION FOR FEASIBILITY STUDIES/EEUAs

Exact landfill name: Jackson County Landfill (Dillsboro, NC)

EPA landfill ID number: NC DENR Permit No. 50-01 and 50-02

City where landfill is located: Dillsboro, NC

County where landfill is located: Jackson Co., NC

Landfill owner name: Jackson County

Landfill mailing/street address, city, state, zip:

Attn.: County Manager
Jackson County
401 Grindstaff Cove Road
Sylva, NC 28779

Landfill owner contact person, phone, fax, e-mail:

James McElduff
Tel.: (828) 281-3350
Fac.: (828) 281-3351
Email: jmcelduff@altamontenvironmental.com

Landfill owner type (public or private): Public

Landfill operator (if different from owner): Same

Landfill operator contact person, phone, fax, e-mail: Landfill is closed and unattended

Year landfill opened: approximately mid-1960s

Year landfill (or individual cells) closed: 12/31/99

Landfill area (acres): approximately 9-acres

Waste depth (feet): maximum waste thickness is approximately 90-feet

Waste in place (tons): approximately 725,000

Annual waste acceptance rate (tons/year): 24,000

Landfill subject to NSPS/EG? (yes/no): No

Please provide a brief description of NSPS/EG status:

Describe any development activities to date: County is currently installing test extraction wells (vertical) as part of a pilot program related to exceedances of LFG criteria at the property line.

Electric utility servicing the landfill: Duke Power

Natural gas utility servicing the landfill or vicinity: None

LANDFILL PRE-SCREENING INFORMATION FOR FEASIBILITY STUDIES/EEUAs
(Continued)

Potential end-users of the LFG within 10 mile radius of landfill (if known): Materials Recycling Facility, Asphalt Plant, Railroad Maintenance Shop, Hotels, Restaurants, and other tourist-related facilities.

Any other information you believe would be helpful to the LMOP:
The landfill is within one mile of several potential year-round energy users - including a Materials Recycling Facility operated by a third party under contract to the County. From a gas generation perspective, waste disposed in the landfill ranges in thickness up to approximately 90-feet. The landfill is located in a lightly populated rural county. Waste disposal was not monitored at the site until the 1980s. Approximately three years of monthly LFG measurements have been collected from gas probes using a closed loop protocol.